Wayne Lynn referred to Joe Feola for more info not yet contacted

33343

RIO personal chat w/ Wayne Lynn. 8-14-75

R. Weems phone notes & Rick Olin phone call to Al Wills Bucks Co. H/Dept. 8-18-75

Bucks Co.
Noxamixon Twp.
Ecco Corp., Revere & Same site

Industrial waste site. Lagoons containing copper liquids and nitrate? Acid waste and copper sulfate waste. Received from metals reclamation process. Site consists of unlined lagoon and waste pile. Groundwater degradation discovered and site under orders. Owner moved and reopened 2 Twp. away.

(Moved to N.C.?) yes

Copper was plating for stainless steel auger used for sampling 3/4 mil. sq. area affected. Minor metals also present.

Domestic and industrial wells nearby affected.

One lagoon and one pile? or what? amount? pile is mainly solid trash + junk - minor problem estimate 8-10 lagoons ~ 4 million gal. capacity.

More specific information on industrial source and name and type of industry. etching and plating solutions / metals reclamation + reprocessing

Exact nature of contaminants or toxic materials? Still companies, plating liquors Cr and Cu from circuit board manf.

Dates of operation? 1965-~~1971~~ 1970

Date problem detected and by whom?

Nature of groundwater degradation? contaminants and concentration?

Any surface water contamination? discharge when rain into surface water ~ 1000 gal. into adjacent creek

What are contaminants in wells? Concentrations of contaminants? well on property reported contam.

What does "3/4 mile square area affected" mean? How and what is affected? approx area of site incl. lagoons

What are minor metals? in what concentrations?

How many industrial wells and domestic wells affected, any closed? N/A

Monitoring wells? No How many? None

Corrective measures? Co. Bankrupt. State hauled liq (after adding lime to ppt. metals + neutralize - for Ocean dump under emergency permit, sludge remains on site -

Current Status?

AR100001

ORIGINAL (Red)

Nockamixon Township

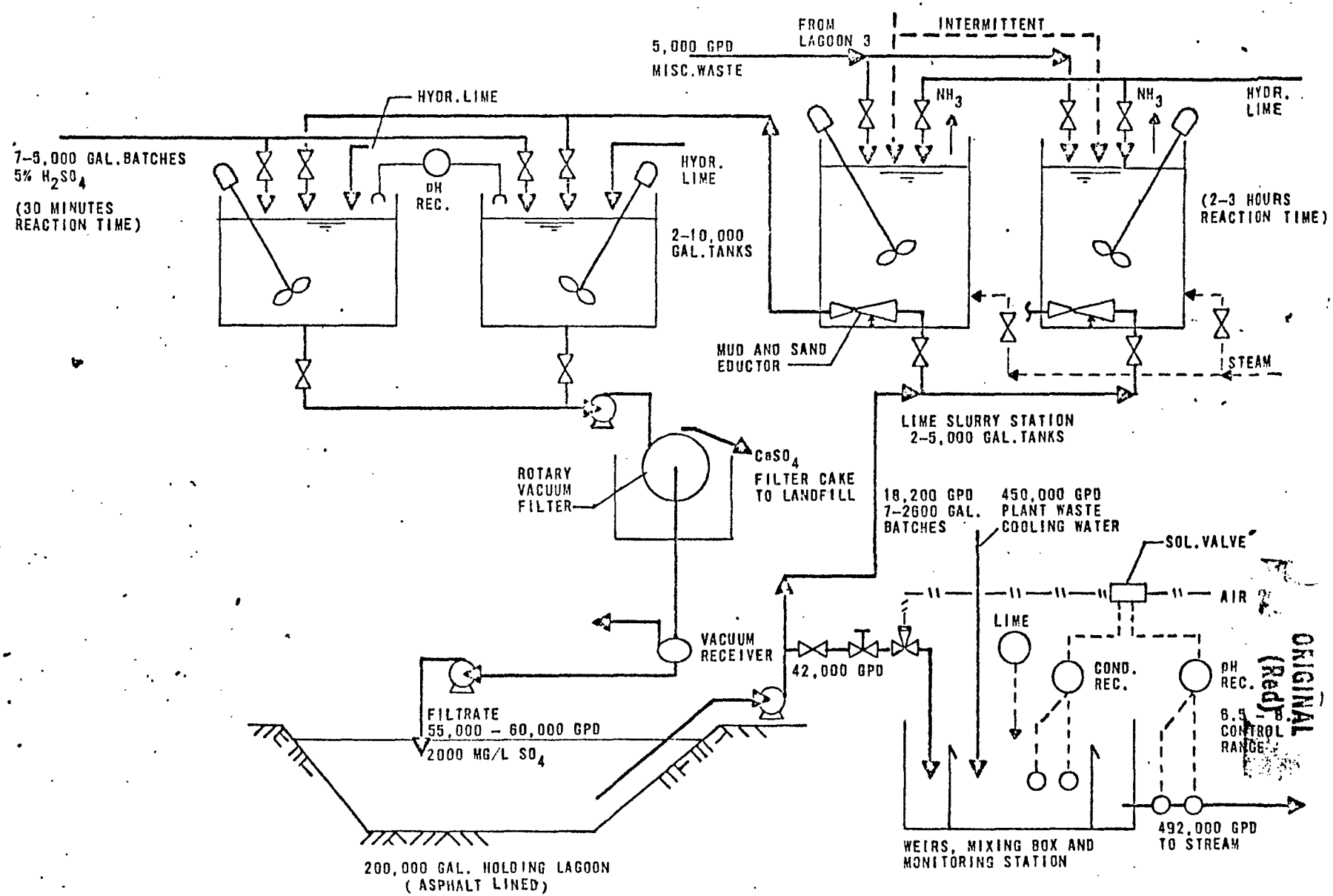
Bucks County

Pennsylvania

INDUSTRIAL WASTE DISPOSAL COSTS PENNSYLVANIA $400,000

The Revere Chemical Company operated a copper reclamation operation northeast of Doylestown from 1965 to 1969. The company bought industrial wastes from other plants, extracted copper, and then stored the remaining liquids in eleven cement lagoons. Three of these lagoons developed open seams on the bottom from which toxic pollutants seeped into an adjacent creek, which became lifeless. Also, the plant grounds became reddish green with sulfuric acid wastes. The County and State, after prolonged litigation, finally got an injunction issued to have all wastes properly treated. Rather than face this expense, the company abandoned the site, leaving the lagoons filled with 3 1/2 million gallons of toxic wastes, and leaving rusting drums of toxic materials strewn about the property. In April 1970, heavy rains threatened to wash much of the toxic wastes in the lagoons into the Delaware River via the adjacent creek. When overflow reached 25 gallons a minute, County officials were forced to have the disposal site sandbagged and a dirt dike built to prevent further overflow. Had the lagoons continued to overflow, the Trenton water supply downstream would have been rendered unusable. Because of this danger, and a steady underground seepage from three of the lagoons, the State was forced to assume the expense of cleaning up the site. At a cost of $400,000 the wastes were neutralized and then ocean dumped in 1971. Although the waste no longer poses a threat to surrounding areas, the original plant site is still contaminated and devoid of vegetation.

ECHO INCORPORATED
NOCKAMIXON TOWNSHIP
BUCKS COUNTY, PENNSYLVANIA
PROPOSED BATCH TREATMENT



PREPARED FROM HYDRONICS DRAWING 3-026-4A

ROY F. WESTON
WEST CHESTER PENNSYLVANIA

DRAWN	DATE	SCALE
JCA	10-1-81	

W.O. NO. 01-0003

DWG. NO.

ORIGINAL (Red)

Re: Novamixon Township, Pa.
Revere Chemical Co.

Ret in

ORIGINAL (Red)

Sunday Times Advertiser

Part Three
FINANCIAL
OBITUARIES
REAL ES[illegible]

88th YEAR — No. 30 PHONE— [illegible] TRENTON, N. J., SUNDAY, JULY 26, 1970 "Second-class postage paid at Trenton, New Jersey"

Pollution Injunction

Boom Lowered On Area Badlands

By JUDI HASSON
Staff Writer

REVERE — A wasteland lies in Nawamixon Township just northeast of Doylestown.

The area stinks with the smell of industrial acid.

Over three and a half million gallons of toxic wastes slop in 11 cement lagoon containers.

The ground is stained an ugly reddish-green with sulfuric acid.

Nothing lives in the two streams surrounding the property because of pollutants.

Hundreds of rusting metal containers filled with toxic material are strewn over the property.

This is the site of the Revere Chemical Company, abandoned last December.

Two weeks ago the Bucks County Court, after three years of court orders and petitions, ordered those involved with the site to clean it up.

Judge Isaac Garb inspected the property and issued a court injunction to dispose of the waste.

It was issued against the Six-Eleven Corporation, Revere Chemical Corp., Revere Chemical Transport Inc., Algonsuin Corp., Echo Corp., Inc., Derewal Chemical Co. Inc., Manfred Derewal and George F. [illegible], all parties involved with the site at one time or another.

All We Could

"We've been doing all we can," said Albert Wills, chief sanitary engineer of Bucks County. "Now, the court has finally given its authority to move on this problem."

The county, which serves as an agent for the state of Pennsylvania, has inspected the site once a week since the company abandoned it.

Three months ago, in April, the situation turned into an emergency. Heavy rainfall in the Delaware Valley threatened to spill over the toxic wastes in the lagoons. The lagoons could have flooded a nearby creek, which eventually flows into the Delaware River.

If that had happened, the Trenton area water supply from the river would have been contaminated and rendered unusable. County officials hauled [illegible] the site and built dirt [illegible] to prevent an overflow.

"About [illegible] gallons of [illegible] waste were [illegible] into the creek every [illegible]," explained Grover G. Emrich, a Pennsylvania geologist. "As long as the toxic liquids remain stored in the lagoons, it is a danger."

They Know How

Local officials know how to get rid of the waste. But it's extremely expensive. They want it done by the owners, as the court has now ordered.

First, it's necessary to neutralize the acid with lime. More than 180 tons of lime will be needed. Then the material must be trucked to an industrial wastes plant where it is turned into sludge and barged out to sea.

"Our main problem has been making sure the dikes around the lagoons hold up so there is no chance of flooding," said Bucks County Commissioner William [illegible].

The toxic liquids are the remains of wastes which the Revere Chemical Company used to extract copper to make printed circuits. The company, operating since 1957, bought industrial wastes from other plants, extracted copper and stored the rest of the liquids in lagoons.

Three cement lagoons have open seams on the bottom and the liquids are slowly seeping into the unnamed creek, polluted long ago.

Still A Threat

"The lagoons still pose a threat," said Wills. "[illegible] is some polluting of the streams surrounding the property. We can stop the overflow of the storage basins, but there's nothing we can do about underground leakage."

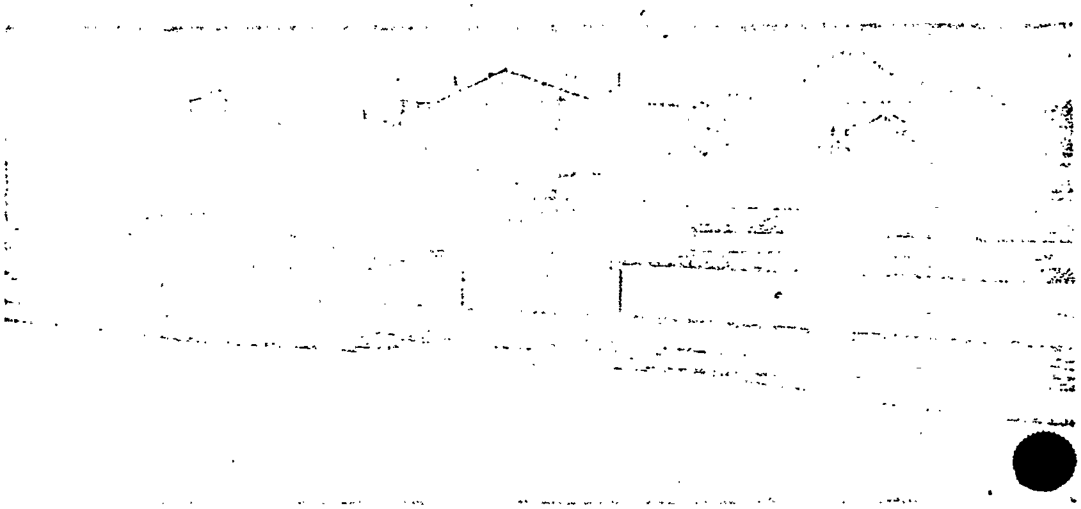
According to County spokesmen, the Revere Chemical Co. haphazardly attempted to abate the problem in several ways. No method worked.

Emrich explained that there is legislation now pending in Pennsylvania to make sure such a situation doesn't occur anywhere else. The act is an amendment to Pennsylvania's clean streams and water act. It will require all storage of waste on a property to be registered with the state.

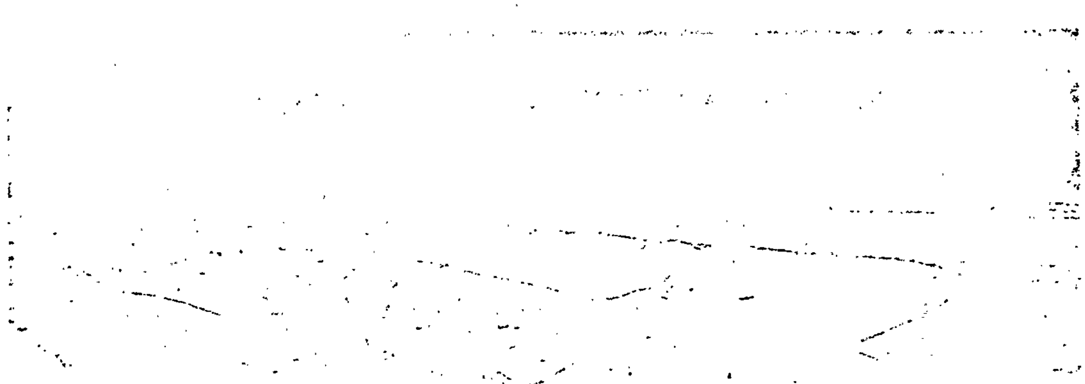
Emrich said there is a good chance that the amendment will be signed during this legislative session.

"We have to make people aware of the [illegible]," said Emrich. "Nothing like this [illegible] happened before."

"The [illegible] the plant [illegible]," said Wills. "[illegible] [illegible] waste [illegible] [illegible] [illegible]."



ABANDONED — Three lagoons full of toxic waste lie in back of the abandoned Revere Chemical Company Plant



STIRRING SLUDGE — Co[illegible] [illegible] work on a lagoon filled with [illegible] waste.

AR100004

ORIGINAL (Red)

ROY F. WESTON

ENVIRONMENTAL SCIENTISTS AND ENGINEERS
LEWIS LANE ▪ WEST CHESTER ▪ PENNSYLVANIA

REPLY TO
LEWIS LANE
WEST CHESTER
PENNSYLVANIA 19380
215-692-3030

11 December 1969

Division of Natural Resources
Court House Building
Doylestown, Pennsylvania

Attention: Mr. Bruce Stewart

RE: Hydrogeologic Study, Hidden Valley Landfill
Central Bucks County

Dear Bruce:

As a result of our visit to the Hidden Valley Landfill yesterday, it would appear that the County faces a potential problem of major proportion due to leachates from the waste directly entering the groundwater system. In this condition it is impossible to estimate the quantity and quality of waste entering the ground. The danger of this operation may be increased substantially by the present method of operation.

Geological conditions at the site are among the most complex in Bucks County. The surface drainage in the area trends in a northwest direction. Judging by the rock structure on the property, groundwaters probably assume a gradient to both the northeast and southwest. The rock is badly fractured for the most part with a frequency of semi-open fracture occurrence at one site in the central property of 4 within 5 feet.

In order to access the groundwater elevations a substantial program may be necessary. It is our suggestion that an initial four-day period be allocated to define the extent of the problem and the procedures necessary to secure sufficient data with which to make an analysis. Work elements during the initial step would include geologic mapping, collection of structural data, determination of probable measurement of water levels in readily available wells. A letter report and proposal would be prepared to enable continuation of study without significant interruption. Costs for the initial effort would be determined by our hourly charge basis presently in use in the County groundwater study.

We have discussed our involvement and the probable implications with your engineer, Mr. William Majors. Mr. Majors has offered his assistance where possible during the project.

I hope this will be sufficient for your needs at this time.

Very truly yours,

Walter B. Satterthwaite, Jr.
Manager
Geology

WBS:ld

ORIGINAL
(Red)

Pump Test at
Revere, Bucks County, Pennsylvania

INTRODUCTION

In response to complaints from a number of residents in the Revere area, ROY F. WESTON visited and inspected well drilling in several wells in early August, 1968. At that time, a relation between lowering of water level and pumping of the new Echo well was noted. In the remainder of August and September, a number of additional wells were either drilled or deepened. The wells include, but are not limited to, the following: Foelmer, Four Winds Tavern, and Degen.

The increasing evidence of drawdown in relation to Echo pumping indicated the need for a cooperative pump test to determine actual conditions.

PUMP TEST

An aquifer pump test is best designed for use of a pumped well and a number of observation wells. For the best results, the observation wells should have pumping equipment removed so that water level recording devices can be installed. The observation wells for this pump test remained equipped with pumping equipment and were used in a limited manner because of the unavailability of alternate sources of water supply. At the start of the pump test, the following wells were selected for use as observation wells: Echo Well No. 2, Bean, Arthur Degen, Foelmer, Penn Rare Metals Well 1, and Penn Rare Metals Well 2. In the latter period of the test, additional wells were added including Shively, Charles Krail, Raub, and Wolfinger.

WATER LEVEL MEASURING DEVICES

The deep static water levels and pumping equipment in the well, as well as available manpower, prevented use of M-scope-type water level measuring devices. Air lines and altitude gauges were installed on the Bean, Degen, and Foelmer wells, while altitude gauges were added to existing air lines in Penn Rare Metals Well 1 and Echo Well 2. The wells added during the mid point of testing were measured with M-scope-type water level devices, while pumping equipment was removed from the Bean well to allow installation and use of a Stevens-type water level recorder.

PRE-PUMP TEST WATER LEVELS

Prior to the start of the pump test, Echo, Inc., cooperated by turning off the big well for a one-week period in order to allow stabilization of water levels. The pre-pump test water levels showed a generally increasing level indicating that they had not yet reached stabilization with the Echo Well 1 off for a one-week period. The water levels just

ORIGINAL
(Red)

May 6, 1975

Al Wills

Bucks Co. Health Dept. 215-343-2800

Ms. Hoyt - Everett

1970-71

State retained co.

2-2.5 million gal.

State put out bids — Modern Transportation Co.

1971 - wastes barged to sea ≈$400,000 - ocean dumped

Pa. Fish Comm. $2000 penalty

no other penalties

still some contamination as soil contamination — no growth

Monumental Collection Agency — present owner — site abandoned at cleanup time ≈ 1970-71

Manfred Derewal

Rohm-Haas case

ORIGINAL (Red)

Liggett 551 Fifth Ave. 212-682-5989

10017

Jack Urakawa or Syd Fox

- Review - 1965 earliest case

~ mid 1970

3½ m. gal.

Sun. Times) Trenton News)

July 26, 1971

analysis of Apr. 3, 1970

2.8 mil. gal. etching) wastes

retained) Cu.

pH = 1.7

5,250 mg/l.	Cu	lagoon samples
35	Cr^{+6}	
1,880	Cr^{+3}	
1300	sulfates	
280	Li	
40,100	Fe	
1400	ammonia	
14000	chlorides	

AR100008

ORIGINAL
(Red)

Page Fielding)
Del. River Basin) Comm. 609-883-9500
call Friday) — April 11

Revere) Chem.
Co. after them; plating) wastes from various)
industry) - would change) names to get out of court
Revere), Echo, Inc., Seven-Eleven, 7-11
series of unlined lagoons; badly contaminated gdwater)
at site), pumped directly) into
caught V.P. sweeping) stream - Sun. morning) -
pollutants) downstream;
Co. & state spent lot of money clean-up—
metallic) wastes)
first recognized late '60's
countryside) looked like) moonscape)
no wells) contaminated)
surface sprayed on area nearby

AR100009

ORIGINAL
(Red)

#14 Boarhead Co., Bucks Co., Bridgeton Twp.; a large # of 55-gal drums containing acid wastes were dumped in site - also ~4000 gal. of acid wastes "spilled" from tank truck; Mr. Manford DeRuler - pres. of Revere Chem. Co. & manager of Boarhead Co.; acids (primarily) ferrous chloride, some Cu; Cr, & Ni) drained into swampy area → into creek → Del. River; state made co. take away drums → sent via truck to Frenchtown, N.J.; groundwater also probably contaminated; monitoring wells ordered by state to be put in - but co. didn't expecting litigation; truck "spillage" occurred Oct., 1973; still getting contaminated groundwater after 1.5 yrs

ATLANTA, GA. NEW YORK, N. Y. PITTSBURGH, PA. CHEVETTE (CHICAGO), ILL.

ROY F. WESTON

HARRY H. CURTIN
JAMES E. GERMAIN
WALTER E. HOOVER, JR.
JOHN H. ROBERTSON
FRANCIS A. SANDERS, PH.D.
WILLIAM D. SITMAN
VERNON T. STACK, JR.
PAUL H. WOODRUFF

ROBERT W. BRANDL
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D. N. BIBBO — J. RONALD LAWSON
THOMAS H. CAHILL — HARRY J. LEHR
JOHN A. DE FILIPPI — UPENDRA C. MANKAD
ALFRED C. DIEFES — DICK M. MILLER
JAMES H. DOUGHERTY — ROBERT P. RELYEA
WILLIAM L. DRY — RICHARD B. SALOMON
EARLE B. FOX — CLEMENT A. VATH
EDWARD F. GILARDI, PH. D — EDWARD J. VOLLRATH
LEONARD R. GRIMES — JOHN F. H. WALKER
GRANT A. HOWELL — ALVIN W. WENE

CONSULTANTS

JAMES D. MC COLL — ELBRIDGE M. SMITH
WALTER B. SATTERTHWAITE, JR

14 October 1968

Mr. John Carson
Bucks County Division of Natural Resources
Court House Building
Doylestown, Pennsylvania

W.O. 264-96

Dear John:

Please find a review of the Echo application for waste treatment. While I have covered the areas of groundwater and sludge disposal, Ken Barnhill has covered the basic treatment system and process.

It is my understanding that the treatment process by-product, calcium sulfate (gypsum), would be produced at an approximate rate of 10 tons per 24-hour operation. This material could not be properly disposed of on-site due to insufficient soil cover and a fractured bedrock. Any waste product should, therefore, be transported to a disposal facility and disposed of under special conditions so that the metallic ions would not gradually leach out and enter the groundwater network.

Conditions for placement of such a material should provide a thick underlying clay soil zone of known relatively impervious character. Such an area should be above the permanent and temporary water table level. Any sludge disposal area should be capped with the same clay soil material and graded to divert water away from the area. At the proposed rate of 3,500 tons per year plus the additional tonnage (approximately 100) from the lagoon and the sludge material from the lagoon could place a definite hardship on a county-owned facility and should, at the minimum, require a substantial additional disposal cost to an Echo-type facility.

The alternative to off-site disposal of waste material must recognize the probability of groundwater and stream contamination that would not necessarily be confined to the Echo property. It is our understanding that high sulfates and .4 ppm copper have been picked up in the Echo wells. While the high sulfate does not immediately prove a relation to

ORIGINAL (Red)

prior to the pump test are tabulated below. The water measurements may be interpreted as depth below ground surface.

Well Location	Depth		
Echo Well 1	125'	~420	295
Echo Well 2	162'	460	298
Bean	236'	520	284
Degen	236'	540	304
Foelmer	202'	520	298
Penn Rare Metals 1	154'	480	326
Penn Rare Metals 2	87'	460	373

PRECIPITATION

During the summer of 1968, a substantial variation in precipitation occurred which ultimately affects ground water levels. The average precipitation versus 1968 precipitation is tabulated below.

Month	Average	Actual
July	4.74"	2.00"
August	4.82"	1.24"
September	3.88"	0.44"
October	3.27"	3.14"

While the average and the actual precipitations are not measured at Revere, their general relationships are considered to be valid.

While the three-month period, July, August, and September, represents a substantial departure from average precipitation (9.76 inches), it must be remembered that water levels in this area were not affected to the degree where additional well drilling was required during the prolonged drought of 1960-1965 in which the 1965 precipitation totaled slightly in excess of 30 inches with a total departure of 15 inches from normal precipitation averages.

A pump test is ideally conducted in a period of no precipitation in order to establish the maximum effect on the ground water level. While general precipitation has been measured at the Philadelphia Station, precipitation during the pump test was measured in a rain gauge located on the Foelmer property. This pump test was delayed in starting due to a significant amount of precipitation (.58 of an inch) on Wednesday, October 16, and Thursday, October 17. Two measured amounts of precipitation occurred during the pump test. The first period of precipitation during the pump test occurred on October 25 where .4 of an inch of rain occurred. A second period of precipitation occurred on October 29 where .1 of an

ORIGINAL
(Red)

inch was measured at 7:50 a.m. One period of precipitation occurred during the recovery test where precipitation was again measured at the Foelmer property in the amount of .1 of an inch of November 3 at 3:00 p.m.

PUMP TEST CAPACITY

Echo Well 2 has previously been pumped for varying periods of time ranging from less than one day to several weeks at its full capacity (350+ gpm).

It is our understanding that the Echo application to the Delaware River Basin Commission requests use of the well at 300,000 gpd or approximately 210 gpm. Since the pump test was primarily designed to determine the effect of Echo on surrounding wells, a pump test capacity of 300 gpm was selected. Graph No. 1, which shows water levels in the pumped well, depicts a variation in the rate of drawdown in the initial portions of the test during which time the capacity was being adjusted to 300 gpm. When the desired capacity was realized, capacity was checked on a less frequent basis (minimum of four times per day) throughout the remainder of the test.

The pump test was interrupted for two relatively short periods of time in the later portion of the test. The first period of interruption occurred when the test pump stopped due to a wire grounding on the casing. The second period of interruption occurred when an electrician for Echo arbitrarily shut the pump off to replace fuses.

WATER USE

Two major water users are found in the Revere area: Echo, Inc., and Penn Rare Metals. Due to a lack of measurement devices, water use for these users is an estimated quantity. The Penn Rare pump operates constantly with an apparent use of 40 gpm. The Echo pump appears to operate for one-third of the time resulting in an overall use of 15 gpm.

The other significant users of lesser quantity would appear to be the three schools in the area: the Palisades School, the elementary school on Route 611, and the parochial school on Route 412. Their total pupil load would presumably be less than 1,000 students, which, at 25 gallons per student per day, would approximate a water usage of 25,000 gpd.

Approximately 60 homes occupy this area. Assuming an average of five persons per family and 100 gallons per person per day, total water usage is estimated to be 30,000 gpd. These figures are tabulated below:

Echo, Inc.	20,000 gpd
Penn Rare Metals	60,000 gpd
Schools	25,000 gpd
Domestic Use	30,000 gpd
Sub-Total	135,000 gpd
Previous Echo Well 1	500,000 gpd
Total	635,000 gpd

GEOLOGY

The area surrounding Revere is underlain by various members of the Triassic Age Newark Group. Generally, the area to the east of Route 611 is underlain by the diabase and igneous rock type which is very resistant to weathering and structural deformity. The central portion of the study area is underlain by the baked Triassic Age sedimentary rocks. The baking has had the effect of hardening and generally altering the chemical and physical makeup of the rock. The western portion of the area is underlain by alternating beds of the Brunswick and Lockatong formations of the Newark Group.

HYDROLOGY

For general purposes, the three units may be considered separately in relation to their hydrologic characteristics. The eastern-most unit, the Triassic diabase, is considered to have such a limited water potential that it may not be considered a significant contributor in this area. Conceivably, its main contribution would be derived from the run-off into Rapp Creek.

The second unit, the baked zone of the Brunswick Lockatong formations, may be generally considered to have a limited water-bearing potential in that the heating-baking effect has tended to fill previous fractures and render the existing sedimentary rock of a denser character which would limit natural permeability.

The remaining area which appears as divided with deeply incised flanks is the primary infiltration zone for the area. Previous reports have categorized the Lockatong formation with such a limited water potential that a safe yield has not been established. On the other hand, the Brunswick has been categorized in the Montgomery County Water Resources Study, 1962, with a safe yield of .27 mgd per square mile. The infiltration area of this area is, in all probability, substantially reduced by the presence of the overlying Lockatong in half of the area.

WATER LEVEL SURFACES

Water level surfaces in the Newark Group are generally found at elevations ranging from 10 to 45 feet below ground surface. In areas where a hilly or incised topography is present, water levels normally range from 50 to 100 feet below ground surface.

Water levels normally tend to mirror the surface topography in that the lowest water levels are found at the tops of the high, narrow hills, while the highest water levels are found in the stream valleys and in the center of the large, flat tablelands seen in some of the area. The primary infiltration zone in the Revere area is divided by a saddle (a topographic high) that extends in a southeast-northwest direction from the diabase where it parallels Route 611. Rapp Creek effectively drains the southern portion of the area while Gallows Run drains the northern half of the area. Both creeks have cut deeply into the underlying rock creating a 60-100-foot relief in much of the area.

area has historically maintained lower water level tables than mal as evidenced by a 165-foot static water level in 1948 for Shively a 138-foot level in 1948 for Clarence Foelmer. More recently, Penn Metals Well 1 maintained a 100-foot static level in 1960, and the t Echo well maintained a 65-foot static water level in 196 . The sent known pumping water levels are significantly different from the inal water levels shown above. We have, in the Echo 2 well, nearly -foot change in water level and a 98-foot decrease in water level the Foelmer well, while the Penn Rare Metals Well 1 shows a 50-foot crease in water level. Significant decreases in water level in this ee aquifer represent a depletion of the ground water in storage; that to say, literally, use of the water at a faster rate than it is being roduced into the aquifer. This area illustrates many of the charac- istics seen in the past in the Lansdale, North Wales area where large ound water withdrawal was concentrated in a small area and withdrawals ceeded infiltration into the aquifer resulting in water levels ranging ! below normal for that area.

comparison purposes, Figures 1 and 2 illustrate water level changes two observation wells located in the Brunswick formation in Bucks nty. Each of the wells shows a general downward trend initiating the July reading, as is normal in this climate. Figure 1 provides et change of 4.5 feet over the three-month period while USGS BK 929 s a net change of slightly less than 3 feet. The performance of these observation wells illustrates the factor that ground water levels re not affected to a point where lack of precipitation or drought alone ld cause wells of this type to become unusable.

P TEST RESULTS

er level data in relation to withdrawal at 300 gpm capacity is seen rawing 1. As is typical for the formation, water levels initially med a steep rate of descent until 20 minutes after the start of the test when a steady rate of descent was initiated. With the excep- of a slight increase in water level occurring from 1,100 minutes ,300 minutes, water levels continued to descend at a nearly steady e. The continually descending water levels are indicative that dis- ge exceeds recharge and, further, that pumping levels would presumably nue their downward trend for an indefinite period of time. During ast nine days of the pump test, water levels descended from 250.5 feet ground surface to nearly 260 feet below ground surface.

VATION WELL PERFORMANCE

six wells initially selected for water level monitoring, four showed an early relationship to pumping at the Echo well. The well initiated a downward trend within approximately ten minutes initiation of pumping. The wells of Echo and Degen provided the

same type drawdown performance. An apparent drawdown was measured in the Foelmer well and the Penn Rare Metals well. While the drawdown in the Foelmer well appears to be definitely related to pumpage at the Echo well, the long delay in drawdown at the Penn Rare Metals well does not show an absolutely clear-cut relationship to the Echo well.

An accepted method of showing relationship to a pumped well consists of measuring recovery performance after the termination of pumping. Under ideal conditions, the recovery curve consists of a mirror image of the drawdown curve. Recovery in the pumping well is shown on Drawing 2, while recovery in other wells is shown on Drawings 4, 5, 7, and 8. The Bean well provides a constant record of recovery until a point near the end of the three-day recovery period when the recorder illustrates a rapid decrease in water level followed by a return to the recovery point. The character of the drawdown and recovery indicates that this anomaly is the result of large-scale pumping. Drawing 5 illustrates a continual recovery performance with the exception of readings at 120, 130, and 140 minutes where pumpage in the Degen well was noted. Drawing 7, which depicts the Shively Well, provides the same pattern of recovery as does Drawing 8 of Echo Well 2. The divergence of points on the Echo well is a function of the type measuring device and the intermittent and unpredictable use of Well 2.

Throughout both the drawdown and recovery portions of the test, the Raub, Wolfinger, and Krail wells did not appear to exhibit water levels where the Echo pumped well has an effect.

It is unfortunate that more wells were not available during the pump test in that, while related drawdowns are shown in a number of wells, these are by no means the entire number of wells that could conceivably be affected by use of Well 2. For purposes of interpretation of water levels, Drawing C illustrates contour lines relating to water level surface above sea level. The lowest contour occurs in close proximity to the Echo pumping well. Had additional wells been available, the contour lines would presumably continue in a southward direction past the pumping well.

CONCLUSIONS

The pump test performed from October 23 to November 3, 1968, documents the previous indication that the Echo well does affect other wells in this area.

The Echo well exhibits the most effect on the Bean, Shively, and Echo 2 wells. A less pronounced effect is evident in the Degen and Foelmer wells. The available resource (safe yield) is exceeded when the Echo well is pumped at 300 gpm (a lesser capacity than it has been previously operated at).

ORIGINAL
(Red)

Were the Echo well to be operated in a continuous manner at .3 mgd, while including present other water uses in the area, the total water withdrawals would exceed the apparent infiltration rate and thereby create a condition where water levels in the area would presumably maintain a general downward trend which would, in effect, cause Echo to eventually reduce its withdrawal and in the meantime cause other water users to drill new wells or deepen existing wells to a substantially greater depth.

ORIGINAL
(Red)

Table 1

Water Sample Results in Relation to the Revere Pump Test
Taken During Pump Test

Date	Sample Source	SO_4	Copper
9/20/68	Echo Pump Well	375	0.0
10/22/68	Echo Pump Well	430	0.0
10/22/68	Echo Pump Well	440	0.0
10/22/68	Echo Pump Well	410	0.0
10/23/68	Echo Pump Well	455	0.0
11/2/68	Echo Pump Well	354	0.06
11/3/68	Echo Pump Well	370	0.04
Recovery	Foelmer Well	26	0.06
Recovery	Degen Well	74	0.05
Recovery	Shively Well	92	0.12

Table 2

Water Sample Results in Relation to the Revere Pump Test
Taken After Pump Test

Sample Source	SO_4	Copper
Palisades School	44.6	.115
Parochial School, Route 412	40.0	.028
Shively	106	.015
Echo 1	180	.02
Foelmer	51.6	.04
Hidden Valley	146	.028
Raub	30	.03
Wolfinger	24.6	.06
Bean	130	.03
Quarry, Route 611	35	.05
Harrow Inn	42.6	.238
In Diabase Rock, near State Park	23	.103

their own waste disposal, copper is not normally found in groundwater supplies in this area. The rock in this area consists of a mediumly fractured shale and silt stone and a variably fractured sandstone. Both rock types are interbedded with the shear zones acting in transmittal to the groundwater table. Continuing placement of waste on-site could do irreparable harm to an extensive geographic area. The proposed plant does not appear to provide any positive safeguard against re-contaminating streams and the groundwater network.

There are six (6) sources of wastes:

1. Miscellaneous wash waters and rinses - 5,000 gpd
2. Proposed waste of 5 percent H_2SO_4, maximum flow - 35,000 gpd
3. Cooling, condenser and eductor water - 450,000 gpd
4. 1,000,000 gallons accumulated waste in Lagoon 3, see Table II attached for composition
5. Small volume chrome waste
6. Sanitary waste

Echo's consultant, Hydronics Corporation, has proposed the following treatments[1] for these wastes:

1. The 5,000 gpd of miscellaneous waste having the characteristics as shown in appended Table 1 would be used to prepare a slurry of hydrated lime utilizing two 5,000-gallon batch tanks. Steam would be introduced at the bottom of the tanks to drive off ammonia vapor.

2. Neutralization of the acid waste would be accomplished in seven 5,000-gallon batches using two 10,000-gallon batch tanks and the slurry prepared in Step 1. Five thousand gallons of 5 percent acid would be added to 3,000 gallons of 7 percent lime slurry to neutralize 90 percent of the acid. Then, additional lime would be added to assure a pH of between 7 and 9. The precipitated $CaSO_4$ and copper hydroxide would be vacuum filtered and the cake containing 50 percent moisture marketed or dumped in a public (sanitary) landfill. A portion of the filtrate (55,000 to 60,000 gallons) would be used to transfer the lime slurry from the slurry tanks to the neutralization tanks. The remaining 42,000 gpd of filtrate would be diluted with plant waste cooling water and treated with lime as needed to keep pH between 6.5 and 8.5 before discharge to the available stream.

[1]Refer to their Flow Diagram attached.

3. The cooling water would be used to dilute a part of the filtrate in Step 2 before disposal to the stream.

4. The 1,000,000 gallons of waste from Lagoon 3 would be batch treated in the slurry tanks as in Step 1. See Table 2 appended for an analysis of Lagoon 3 waste.

5. A small volume hexavalent chrome waste would be reduced by sodium bisulfite or ferrous chloride at a pH of 3 in a 1,000-gallon batch tank to trivalent chrome and then precipitated with lime to pH 7 to form insoluble chromium hydrate ($Cr(OH)_3$). This precipitate was to be filter pressed. The cake was to be disposed of to public landfill and filtrate added to the miscellaneous waste.

6. Sanitary waste from a work force of 40 is disposed of to a septic tank and percolation field.

There are a number of weaknesses in the proposed schemes of treatment:

1. Odor - The release of sizable quantities of ammonia will simply add to the unpleasant atmosphere of the area which we understand is subject to periodic temperature inversions.

2. Processing one million gallons of Lagoon 3 waste would take 200 days at the rate of 5,000 gpd, and Lagoon 3 waste has approximately four times as much ammonia, seventeen times as much copper, sixty times as much iron, and 6.5 times as much sulfate as the miscellaneous waste.

3. Marketing of calcium sulfate ($CaSO_4$) cake does not hold much promise and disposal to public sanitary landfill will probably meet objections. Disposal on-site would further degrade the quality of the groundwater, unless suitably sealed.

4. The high sulfate and copper content of the No. 3 well while other wells in the area are low in sulfate and copper is evidence that Echo's own waste has probably found its way into the aquifer.

5. Dilution of the final waste effluent assumes that No. 3 well will be pumped continuously at 300 gpm. If No. 3 well is pumped in this manner, it raises the question of the water table dropping and adversely affecting the capacity of other producing wells in the area.

6. From discussions with Hydronics Corporation, we have learned that the State Board of Health has insisted on much lower copper and sulfate content in the diluted discharge than the treatment and dilution will provide. Furthermore, the stream into which the plant effluent is to discharge has no flow half the year.

I hope that this will be sufficient background for the coming hearing. We will make ourselves available at your request for any testimony that you might desire.

Very truly yours,

Walter B. Satterthwaite Jr.

Walter B. Satterthwaite, Jr.
Consulting Geologist

Kenneth G. Barnhill

Kenneth G. Barnhill, P.E.

WBS:KGB:smg

Enclosures

ORIGINAL
(Red)

Table 1

Miscellaneous Waste

Cations	mg/L	#/K gal.	#/day Before Heating	#/day After Heating
NH_3	1250	10.4	52	5.2
Ca	370	3.1	15.5	15.5[1]
Cu	70	0.6	3.0	0.06
Fe	4	0.03	0.2	0.2
Na	450	3.8	19.5	19.5
Ni	0	-	-	-
Anions				
SO_4	4350	36 3	181	68.7
Cl	400	3.3	16.5	16.5
Persulfate	1545	12.9	65.0	-
PO_4	5	0.04	0.2	0.2
Cyanide	0	-	-	-
Chromate	0	-	-	-

[1]Excluding lime in slurry

ORIGINAL
(Red)

Table 2

Accumulated Lagoon No. 3 Waste

Cations	mg/L	Anions	mg/L
NH_3	4,550	SO_4	28,100
Ca	590	Cl	1,250
Cu	1,200	Chromate	0
Fe	240	Cyanide	0
Na	670		
Ni	0		

pH 2.7 to 8.0